

2

**CHARACTERISTICS OF PHYSICAL TRAINING ACTIVITIES  
OF WEST COAST U.S. NAVY SEA-AIR-LAND  
PERSONNEL (SEALS)**

**DTIC**  
**ELECTE**  
**MAR 9 1993**  
**S C D**

**W. K. Prusaczyk**

**H. W. Goforth**

**M. L. Nelson**

**Report No. 90-35**

**93-04974**



98

3

8

092

Approved for public release: distribution unlimited.

**NAVAL HEALTH RESEARCH CENTER  
P.O. BOX 85122  
SAN DIEGO, CALIFORNIA 92186-5122**

**NAVAL MEDICAL RESEARCH AND DEVELOPMENT COMMAND  
BETHESDA, MARYLAND**



Accession For	
NTIS CRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution /	
Availability Codes	
Dist	Avail and/or Special
A-1	

## **Characteristics of Physical Training Activities of West Coast U.S. Navy Sea-Air-Land Personnel (SEALs)**

W.K. Prusaczyk, Ph.D.<sup>1</sup>  
H.W. Goforth, Jr., Ph.D.<sup>2</sup>  
M.L. Nelson, M.S.<sup>2</sup>

Naval Health Research Center  
P.O. Box 85122  
San Diego, California 92186-5122

Report Number 90-35 was supported by the U.S. Navy Medical Research and Development Command under Research Work Unit No. 62233N MM33P30.002-6005. The opinions expressed in this paper are those of the authors and do not reflect official policy or position of the Department of the Navy, the Department of Defense, or the U.S. Government.

<sup>1</sup> GEO-CENTERS, Inc., 10903 Indian Head Highway, Fort Washington, Maryland, 20744

<sup>2</sup> Naval Health Research Center, P.O. Box 85122, San Diego, California, 92186-5122

### SUMMARY

A detailed physical training activity questionnaire was administered to U.S. Navy Special Warfare (NSW) Sea, Air, Land (SEAL) personnel undergoing advanced training. Responses to this questionnaire provided information on the types, frequencies, and intensities of aerobic and strength conditioning activities in which the SEALs engaged, as well as the locations in which these activities occurred. These data were used to evaluate the training programs currently used by the West Coast SEALs.

One hundred and two (102) SEALs completed the questionnaire; their responses were used to characterize training activity according to the American College of Sports Medicine guidelines for maintenance of aerobic and strength fitness. Overall, SEALs reported engaging in aerobic activities (running, bicycling, and swimming) in frequencies, intensities, and durations appropriate for maintenance of aerobic fitness levels. Strength conditioning also occurred with sufficient frequency and quantity for maintenance of current levels of muscular strength fitness; however, during strength training, more time was used concentrating on upper-body muscles.

Although SEALs participated in aerobic and strength training in quantities sufficient to maintain fitness, the overall volume of training was somewhat less than for most elite or competitive athletes. The quality of the physical training programs varied widely depending on the advanced course/activity in which the SEALs were engaged. Through education in the basic principles of athletic training, SEALs could implement more effective training regimens to develop and maintain aerobic and strength fitness. Ultimately, SEALs could achieve higher levels of readiness for demanding missions.

## INTRODUCTION

U.S. Navy Special Warfare (NSW) Sea, Air, Land (SEAL) personnel engage in missions requiring high levels of aerobic fitness, muscular strength, power, and endurance. A wide range of physical fitness attributes are necessary to successfully complete operations in both terrestrial and maritime environments while transporting moderate to heavy loads. It has been suggested that SEALs may rely on their physical attributes more than any other group in the military (Barnes and Strauss, 1986). In addition, SEALs are required to maintain higher fitness standards than other Navy Fleet personnel (BUPERS Manual 1410-380). Physical fitness and anthropometric profiles of Basic Underwater Demolition/SEAL (BUD/S) trainees and SEALs have been reported previously (Beckett et al., 1989). These profile data showed that both BUD/S trainees and platoon SEALs possess a relatively high aerobic capacity ( $62.4 \text{ ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$  and  $57.7 \text{ ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$ , respectively), but SEALs are somewhat stronger. Further, SEALs possess a high mesomorphic component ( $5.9 \pm 0.9$ ) on the Heath-Carter somatotype rating scale (Carter, 1980). Interestingly, the mesomorphy rating reported for successful BUD/S trainees in 1989 ( $5.8 \pm 0.8$ ) was not significantly different from that reported for successful trainees in 1975 ( $5.9 \pm 1.5$ ) (Beckett et al., 1989; Carter and Rahe, 1973). These profile data provide a baseline from which to evaluate the effects of training practices employed by SEALs in order to maintain high levels of physical fitness.

To maintain a high level of fitness, SEALs perform regular physical training with their platoons or detachments. Also, these men typically engage in additional voluntary physical training (Barnes and Strauss, 1986), either individually or in small group/skill sport activities. Documentation of SEALs' physical training practices allows analysis of the suitability of their training regimens for maintaining aerobic and strength fitness. A database of current practices also provides a basis from which to determine if any modifications should be recommended for existing programs. The purpose of this study was to determine if SEALs train optimally in their efforts to maintain aerobic and strength fitness at levels required during physically demanding missions.

## MATERIALS AND METHODS

Physical activity questionnaires (Attachment 1) were distributed to 105 West Coast SEALs undergoing advanced training at SEAL Teams Three and Five, and Seal Delivery Vehicle (SDV) Team One. SEALs were attending one of eleven different advanced training courses/activities: 1) Combat Swimmer; 2) Land Warfare; 3) Maritime Operations; 4) Cold Weather Training; 5) Classroom Preparation; 6) Stand-Down Preparation; 7) Mission Preparation; 8) Exercises; 9) Field Activities; 10) Core Training; or 11) Advanced SDV Operator Training. The questionnaire was designed to collect data on the characteristics of SEALs' physical training, including the types of fitness activities (i.e., aerobic, anaerobic, strength, skill/team sport), frequency, duration, and intensity of participation, as well as training activity locations and conditions.

## RESULTS

A total of 102 questionnaires were completed and were used in the analyses.<sup>1</sup> Respondents' mean ( $\pm$  standard deviation [SD]) age, height, and weight were 27 ( $\pm$  6.0) yr., 70.0 ( $\pm$  2.4) in., and 172.8 ( $\pm$  18.2) lbs., respectively; these characteristics are very similar to those reported previously for platoon SEALs (Beckett, et al., 1989). The mean frequency with which SEALs engaged in individual physical conditioning activities, and the number of respondents participating in those activities, are presented in Table 1.

Table 1. Frequency of participation (times per week) in fitness activities during advanced training.

ACTIVITY	NUMBER OF RESPONDENTS	MEAN	STANDARD DEVIATION
Running	98	3.3	1.3
Weightlifting	72	3.3	1.7
Calisthenics	93	2.6	1.3
Bicycling	64	2.4	1.6
Walking	24	2.3	2.0
Swimming	95	1.9	0.9
Aerobic Class	12	1.8	0.9
Scuba/Snorkeling	73	1.5	1.0
Rowing	10	1.5	0.9
Obstacle Course	78	1.1	0.3

Frequency scale: 0 - (never); 1 - ( $\leq$  1x/wk); 2 - (2x/wk); 3 - (3x/wk);  
4 - (4x/wk); 5 - (5x/wk); 6 - (6x/wk); 7 - ( $\geq$  7x/wk)

<sup>1</sup> NUMBER OF RESPONDENTS varies among tables, reflecting the total number of respondents completing each questionnaire item.

SEALs' mean frequency and number of respondents participating in various skill, team, and other organized sports are summarized in Table 2.

Table 2. Frequency of participation (times per week) in skill, team, and other activities during advanced training.

ACTIVITY	NUMBER OF RESPONDENTS	MEAN	STANDARD DEVIATION
Volleyball	34	1.4	1.3
Racket Sports/Handball	19	1.3	0.8
Football	18	1.2	0.9
Other	14	3.4	1.8
Martial Arts	14	2.6	1.9
Boxing/Wrestling	13	1.7	1.5
Basketball	12	1.0	0.0
Baseball/Softball	11	1.3	0.9

Frequency scale: 0 - (never); 1 - ( $\leq 1x/wk$ ); 2 - ( $2x/wk$ ); 3 - ( $3x/wk$ ); 4 - ( $4x/wk$ ); 5 - ( $5x/wk$ ); 6 - ( $6x/wk$ ); 7 - ( $\geq 7x/wk$ )

The attributes of running, the most frequently employed aerobic training activity, are presented in Tables 3 through 6. These tables summarize the frequency (runs/week), duration (minutes/day), volume (miles/week), and intensity (minutes/mile), respectively, of run training for members of each training status. To determine total time of running per week, the product of frequency and duration was calculated. The mean frequency-duration product was 162.7 minutes/week, ranging from a low of 83.0 minutes/week for SDV Advanced Operator Training to a high of 220.0 minutes/week for Combat Swimmers.

Table 3. Number of runs per week during advanced training.

TRAINING STATUS	NUMBER OF RESPONDENTS	MEAN	STANDARD DEVIATION
Advanced Operator Training	6	2.2	1.6
Classroom	6	3.2	0.4
Cold Weather Training	2	3.0	0.0
Combat Swimmer	6	5.3	4.4
Core Training	2	3.0	1.4
Exercises	4	3.8	1.7
Field Activities	8	3.4	0.9
Land Warfare	19	3.4	1.1
Maritime Operations	8	3.7	1.3
Other	15	3.2	1.4
Preparation	12	3.5	1.4
Combined	88	3.4	

Table 4. Total daily running time (minutes per run) during advanced training.

TRAINING STATUS	NUMBER OF RESPONDENTS	MEAN	STANDARD DEVIATION
Advanced Operator Training	5	35.4	8.4
Classroom	5	35.0	7.1
Cold Weather Training	2	42.5	3.5
Combat Swimmer	5	52.0	38.5
Core Training	2	22.5	10.1
Exercises	4	29.8	19.2
Field Activities	8	37.5	6.6
Land Warfare	19	41.5	22.7
Maritime Operations	8	36.1	10.8
Other	13	37.0	16.1
Preparation	10	34.0	6.5
Combined	88	34.8	

Table 5. Total weekly running mileage during advanced training.

TRAINING STATUS	NUMBER OF RESPONDENTS	MEAN	STANDARD DEVIATION
Advanced Operator Training	6	10.2	8.3
Classroom	6	20.0	10.4
Cold Weather Training	2	11.5	5.0
Combat Swimmers	6	34.0	33.0
Core Training	2	9.5	2.1
Exercises	4	17.0	7.9
Field Activities	8	18.8	9.3
Land Warfare	19	14.4	5.7
Maritime Operations	8	18.4	8.4
Other	14	13.6	7.9
Preparation	12	17.9	11.5
Combined	85	17.0	

Table 6. Average running pace (minutes per mile) during advanced training.

TRAINING STATUS	NUMBER OF RESPONDENTS	MEAN	STANDARD DEVIATION
Advanced Operator Training	6	7.1	0.6
Classroom	6	6.5	0.4
Cold Weather Training	2	7.0	0.7
Combat Swimmer	6	7.0	0.3
Core Training	2	6.0	1.4
Exercises	4	7.0	0.7
Field Activities	8	7.2	1.1
Land Warfare	19	7.1	0.7
Maritime Operations	8	7.1	0.7
Other	15	6.8	0.8
Preparation	12	7.0	0.8
Combined	88	7.0	

Only 5% of the respondents reported using running and/or walking with load carriage (backpacks) as a training activity. The mean ( $\pm$  SD) load carried by SEALs was 22.3 ( $\pm$  11.3) kg, which constituted 28.0 ( $\pm$  13.9) percent of an average SEAL's total body mass. Load carriage activity data are presented in Tables 7 and 8.

Table 7. Average running pace (minutes per mile) with load during advanced training.

TRAINING STATUS	NUMBER OF RESPONDENTS	MEAN	STANDARD DEVIATION
Advanced Operator Training	2	8.0	1.4
Cold Weather Training	1	8.0	0.0
Combat Swimmer	2	8.3	0.4
Exercises	2	8.1	0.9
Field Activities	1	11.0	0.0
Land Warfare	2	10.0	0.0
Other	2	9.0	1.4
Preparation	1	12.0	0.0
Combined	13	9.1	

Table 8. Average walking pace (minutes per mile) with load during advanced training.

TRAINING STATUS	NUMBER OF RESPONDENTS	MEAN	STANDARD DEVIATION
Advanced Operator Training	1	16.0	0.0
Classroom	1	24.0	0.0
Cold Weather Training	2	10.3	0.4
Exercises	1	10.5	0.0
Field Activities	1	18.0	0.0
Land Warfare	5	16.4	7.7
Maritime Operations	1	20.0	0.0
Other	4	12.3	0.5
Preparation	5	19.6	0.9
Combined	21	16.1	

Table 9 summarizes the characteristics of the locations/conditions of SEALs' aerobic activities. Running was performed most often (65% of runs) on hard surfaces, with hard sand/packed dirt the preferred surface (29%), followed by asphalt (21%), concrete (15%), and artificial tracks (1%). Soft sand and grass were used 26% and 7% of the time, respectively. Swim training was performed in the ocean 63% of the time and 37% of the time in a pool. The percentages of swims, with and without fins, were the same as the percentages of ocean and pool swims (i.e., 63% and 37%, respectively), suggesting that SEALs use fins when



swimming in the ocean but not when swimming in a pool. As expected, scuba and snorkeling activities were most frequently conducted in the ocean (85% of the time). SEALs averaged 2.2 miles/week swimming during scuba/snorkeling at an intensity (pace) that varied with training status and ranged from 31.7 to 55.3 minutes/mile (Table 10).

Table 9. Frequency of use (time per week) of physical training location/conditions for aerobic activities.

ACTIVITY	NUMBER OF RESPONDENTS	MEAN	STANDARD DEVIATION
Swim Ocean	88	1.5	0.6
Swim Fins	82	1.6	0.7
Swim Pool	56	1.4	0.9
Swim No Fins	56	1.4	0.9
Scuba/Snorkel Ocean	69	1.5	0.9
Scuba/Snorkel Fins	69	1.5	1.0
Scuba/Snorkel No Fins	14	1.2	0.4
Scuba/Snorkel Pool	12	1.5	0.8
Run on Sand	95	1.8	1.1
Run on Dirt	87	2.2	1.2
Run on Asphalt	75	1.9	1.1
Run on Concrete	55	1.8	1.0
Run on Grass	33	1.4	0.7
Run on Track	9	1.0	0.0
Row Machine	8	1.5	0.8
Row Boat	5	1.2	0.5
Bicycle Road	53	2.5	1.6
Bicycle Stationary	18	2.2	1.4

Frequency scale: 0 - (never); 1 - ( $\leq 1x/wk$ ); 2 - ( $2x/wk$ ); 3 - ( $3x/wk$ ); 4 - ( $4x/wk$ ); 5 - ( $5x/wk$ ); 6 - ( $6x/wk$ ); 7 - ( $\geq 7x/wk$ )

Table 10. Average swimming pace (minutes per mile) while scuba/snorkeling during advanced training.

TRAINING STATUS	NUMBER OF RESPONDENTS	MEAN	STANDARD DEVIATION
Advanced Operator Training	4	32.0	2.3
Classroom	2	49.0	1.4
Cold Weather Training	2	55.0	7.1
Exercises	3	55.3	9.3
Land Warfare	6	37.9	15.5
Other	3	31.7	24.7
Preparation	4	45.0	17.3
Combined	24	41.9	

SEALs who bicycled (63% of respondents) reported exercising on the road 77% of the time and on a stationary bicycle 23% of the time (see Table 9). Only 10% of SEALs used rowing as an aerobic training activity. Of those, respondents reported using rowing machines 67% of the time and a boat/shell the remaining 33% of the time.

Table 11 summarizes SEALs' participation in skill/team activities. Participation in these activities was far less frequent than for individual aerobic and strength conditioning activities, occurring only slightly more than once per week (mean = 1.3 times/week). Volleyball (on all surfaces) was the most popular skill/team activity, with a mean frequency of participation of 1.5 times/week.

Table 11. Frequency of use (times per week) of physical training location/condition for skill and team activities.

ACTIVITY	NUMBER OF RESPONDENTS	MEAN	STANDARD DEVIATION
Racket Sports/Handball on Wood	17	1.1	0.5
Racket Sports/Handball on Asphalt	6	1.3	0.8
Racket Sports/Handball on Concrete	6	1.3	0.8
Basketball on Wood	12	1.0	0.0
Basketball on Asphalt	7	1.1	0.4
Basketball on Concrete	6	1.0	0.0
Volleyball on Sand	28	1.5	1.3
Volleyball on Asphalt	19	1.3	0.7
Volleyball on Grass	13	1.5	1.7
Volleyball on Wood	12	1.8	1.8
Volleyball on Concrete	9	1.1	0.3

Frequency scale: 0 - (never); 1 - ( $\leq 1x/wk$ ); 2 - ( $2x/wk$ ); 3 - ( $3x/wk$ ); 4 - ( $4x/wk$ ); 5 - ( $5x/wk$ ); 6 - ( $6x/wk$ ); 7 - ( $7x/wk$  or more)

Weightlifting sessions lasted an average of 55 minutes and tended to concentrate on upper-body exercises. Detailed information on the number of sets performed, number of repetitions per set, perceived intensity of exercise, weights used, duration of each exercise, and one-repetition maximal (1-RM) weight lifted are presented in Table 12.

Tables 13 and 14 summarize the frequency, duration, and perceived intensity of SEALs' participation in each of the individual physical training activities and in the skill/team sports, respectively.

Table 12. Characteristics of weightlifting exercise.

## SETS (NUMBER)

EXERCISE	NUMBER OF RESPONDENTS	MEAN	STANDARD DEVIATION	RANGE
Neck	11	3.3	0.7	2-4
Upright Rowing	18	3.9	1.3	3-8
Bent Rowing	20	4.1	1.2	3-8
Bench Press	49	4.7	1.8	1-9
Military Press	37	4.1	1.3	1-8
Incline Press	34	4.4	1.4	3-8
Biceps Curl	42	4.4	1.5	3-9
Triceps Curl	34	4.2	1.2	3-8
Latissimus Pull	35	4.2	1.7	1-9
Wrist Curl	10	3.9	1.0	3-6
Sit-up	19	3.6	1.4	1-6
Leg Press	16	4.2	1.1	3-6
Squat	18	4.1	0.9	3-6
Leg Curl	21	4.1	1.1	1-6
Toe Raises	16	4.3	1.2	3-6
Leg Extension	20	4.2	0.9	3-6
Stair Climb	4	3.8	1.0	3-5
Other	7	3.0	1.9	0-5

## ONE-REPETITION MAXIMUM (POUNDS)

EXERCISE	NUMBER OF RESPONDENTS	MEAN	STANDARD DEVIATION	RANGE
Neck	1	140.0	---	---
Upright Rowing	8	128.8	40.4	50-180
Bent Rowing	12	191.3	59.6	50-260
Bench Press	31	255.2	55.2	180-450
Military Press	23	170.9	53.9	75-300
Incline Press	20	200.1	40.0	135-275
Biceps Curl	25	114.0	34.0	40-185
Triceps Curl	15	109.7	43.6	55-200
Latissimus Pull	17	178.2	31.6	110-225
Wrist Curl	1	20.0	---	---
Sit-up	6	63.3	63.1	10-175
Leg Press	7	357.9	107.0	180-530
Squat	10	299.0	105.0	200-500
Leg Curl	9	140.6	48.1	75-200
Toe Raises	5	279.0	48.3	225-350
Leg Extension	10	183.0	46.4	120-260
Stair Climb	1	8.0	---	---
Other	4	78.5	70.0	4-150

Table 12. Characteristics of weightlifting exercise (cont'd).

REPETITIONS (PER SET)				
EXERCISE	NUMBER OF RESPONDENTS	MEAN	STANDARD DEVIATION	RANGE
Neck	9	11.8	6.9	8-30
Upright Rowing	16	9.9	4.2	7-25
Bent Rowing	19	9.4	2.4	6-15
Bench Press	48	8.2	2.3	1-12
Military Press	37	8.8	1.4	6-12
Incline Press	34	8.8	1.3	6-10
Biceps Curl	43	9.6	2.8	6-20
Triceps Curl	32	9.5	2.5	6-20
Latissimus Pull	34	9.1	2.1	5-15
Wrist Curl	8	9.4	1.4	8-12
Sit-up	17	33.8	30.9	8-99
Leg Press	16	11.1	5.9	6-30
Squat	17	12.8	12.6	6-60
Leg Curl	20	11.1	5.3	8-30
Toe Raise	15	11.3	4.2	8-20
Leg Extension	19	11.6	5.8	8-30
Stair Climb	1	9.0	---	---
Other	9	9.4	2.7	6-15

## PERCEIVED EFFORT

EXERCISE	NUMBER OF RESPONDENTS	MEAN	STANDARD DEVIATION	RANGE
Neck	11	7.0	2.9	2-10
Upright Rowing	16	7.6	2.1	4-10
Bent Rowing	20	7.8	2.3	0-10
Bench Press	46	7.5	2.0	3-10
Military Press	35	7.7	1.7	4-10
Incline Press	33	7.5	1.9	4-10
Biceps Curl	42	7.3	1.8	4-10
Triceps Curl	31	7.5	1.8	4-10
Latissimus Pull	33	7.6	1.8	4-10
Wrist Curl	8	8.0	3.3	0-10
Sit-up	17	7.5	2.8	0-10
Leg Press	15	8.1	1.8	4-10
Squat	16	8.8	1.6	5-10
Leg Curl	19	8.5	1.8	4-10
Toe Raise	15	7.5	3.0	0-10
Leg Extension	18	8.7	1.3	6-10
Stair Climb	4	6.0	4.0	0- 8
Other	8	8.3	1.4	6-10

Perceived effort scale: 1 - very easy; 2 - easy; 3-4 - moderately difficult;  
5-6 - difficult; 7-8 - intense; 9-10 - very intense

Table 12. Characteristics of weightlifting exercise (cont'd).

## WEIGHTS USED (POUNDS)

EXERCISE	NUMBER OF RESPONDENTS	MEAN	STANDARD DEVIATION	RANGE
Neck	7	80.7	61.0	10-180
Upright Rowing	13	95.8	27.0	60-150
Bent Rowing	15	130.0	28.2	80-175
Bench Press	42	186.8	47.3	100-365
Military Press	32	122.5	37.1	70-250
Incline Press	29	140.5	43.0	45-230
Biceps Curl	38	75.7	22.6	30-115
Triceps Curl	27	76.6	32.4	20-180
Latissimus Pull	27	137.4	32.0	25-180
Wrist Curl	4	57.4	28.4	40-100
Sit-up	6	83.0	86.5	25-208
Leg Press	10	237.5	68.7	90-315
Squat	11	215.5	90.0	90-400
Leg Curl	14	94.6	33.8	50-160
Toe Raise	6	193.3	57.2	100-250
Leg Extension	13	128.2	41.3	70-190
Stair Climb	--	---	---	---
Other	4	103.8	52.8	35-150

## EXERCISE DURATION (MINUTES)

EXERCISE	NUMBER OF RESPONDENTS	MEAN	STANDARD DEVIATION	RANGE
Neck	7	10.9	9.6	1-30
Upright Rowing	10	10.2	5.9	2-10
Bent Rowing	12	9.8	4.8	2-20
Bench Press	34	13.0	8.6	1-40
Military Press	27	9.6	5.2	1-20
Incline Press	22	11.0	5.3	1-20
Biceps Curl	30	11.0	5.6	1-25
Triceps Curl	22	10.7	4.2	4-20
Latissimus Pull	21	11.1	6.3	1-20
Wrist Curl	6	9.7	6.8	2-20
Sit-up	10	9.4	6.5	1-20
Leg Press	9	11.8	5.7	4-20
Squat	8	10.0	6.0	4-20
Leg Curl	11	9.2	5.7	1-20
Toe Raise	10	10.6	5.4	5-20
Leg Extension	11	10.6	6.2	2-20
Stair Climb	3	7.0	7.2	1-15
Other	7	7.4	5.2	1-15

Table 13. Summary of the quality and quantity of physical training activities of West Coast SEALs.

<u>ACTIVITY</u> Attribute	NUMBER OF RESPONDENTS	MEAN	STANDARD DEVIATION
<u>RUNNING</u>			
Frequency	98	3.3	1.3
Intensity	93	5.5	2.0
Duration	101	4.3	1.2
<u>SCUBA/SNORKELING</u>			
Frequency	73	1.5	1.0
Intensity	67	4.1	2.0
Duration	71	6.0	1.9
<u>SWIMMING</u>			
Frequency	95	1.9	0.9
Intensity	89	5.1	1.8
Duration	94	4.3	1.3
<u>BICYCLING</u>			
Frequency	64	2.4	1.6
Intensity	60	4.8	2.1
Duration	61	4.5	2.0
<u>ROWING</u>			
Frequency	10	1.5	0.9
Intensity	8	5.5	2.7
Duration	8	3.8	1.2
<u>WALKING</u>			
Frequency	24	2.3	2.0
Intensity	20	3.3	1.3
Duration	21	4.5	2.1
<u>AEROBICS CLASS</u>			
Frequency	12	1.8	0.9
Intensity	10	4.8	2.0
Duration	10	4.4	1.9
<u>WEIGHTLIFTING</u>			
Frequency	72	3.3	1.7
Intensity	67	6.5	2.1
Duration	72	5.8	1.5
<u>CALISTHENICS</u>			
Frequency	93	2.6	1.3
Intensity	86	6.0	2.0
Duration	85	4.8	1.5
<u>OBSTACLE COURSE</u>			
Frequency	78	1.1	0.3
Intensity	74	6.1	2.2
Duration	1	4.0	---

Frequency scale: 0 - (never); 1 - ( $\leq 1x/wk$ ); 2 - ( $2x/wk$ ); 3 - ( $3x/wk$ ); 4 - ( $4x/wk$ ); 5 - ( $5x/wk$ ); 6 - ( $6x/wk$ ); 7 - ( $7x/wk$  or more)

Intensity scale: 1 - very easy; 2 - easy; 3-4 - moderately difficult; 5-6 - difficult; 7-8 - intense; 9-10 - very intense

Duration scale (minutes): 0 - (not applicable); 1 - ( $< 11$ ); 2 - ( $11-20$ ); 3 - ( $21-30$ ); 4 - ( $31-40$ ); 5 - ( $41-50$ ); 6 - ( $51-60$ ); 7 - ( $61-119$ ); 8 - ( $120-180$ ); 9 - ( $> 180$ )

Table 14. Summary of the quality and quantity of skilled physical activities of West Coast SEALs.

<u>ACTIVITY</u> Attribute	NUMBER OF RESPONDENTS	MEAN	STANDARD DEVIATION
<u>RACKET SPORTS/HANDBALL</u>			
Frequency	19	1.3	0.8
Intensity	18	4.4	1.8
Duration	19	5.2	1.7
<u>BASKETBALL</u>			
Frequency	12	1.0	0.0
Intensity	12	3.7	1.7
Duration	13	4.8	1.5
<u>BASEBALL/SOFTBALL</u>			
Frequency	11	1.3	0.9
Intensity	10	3.7	1.6
Duration	12	5.9	1.4
<u>FOOTBALL</u>			
Frequency	18	1.2	0.9
Intensity	17	4.3	2.6
Duration	17	5.4	1.1
<u>VOLLEYBALL</u>			
Frequency	34	1.4	1.3
Intensity	32	4.2	2.3
Duration	33	5.4	1.8
<u>BOXING/WRESTLING</u>			
Frequency	13	1.7	1.5
Intensity	2	1.0	0.0
Duration	10	5.5	2.4
<u>MARTIAL ARTS</u>			
Frequency	14	2.6	1.9
Intensity	14	6.5	1.7
Duration	15	6.7	1.5
<u>OTHER</u>			
Frequency	14	3.4	1.8
Intensity	12	7.2	2.9
Duration	14	7.0	2.4

Frequency scale: 0 - (never); 1 - ( $\leq 1x/wk$ ); 2 - ( $2x/wk$ ); 3 - ( $3x/wk$ ); 4 - ( $4x/wk$ ); 5 - ( $5x/wk$ ); 6 - ( $6x/wk$ ); 7 - ( $\geq 7x/wk$ )

Intensity scale: 1 - very easy; 2 - easy; 3-4 - moderately difficult; 5-6 - difficult; 7-8 - intense; 9-10 - very intense

Duration scale (minutes): 0 - (not applicable); 1 - ( $< 11$ ); 2 - ( $11-20$ ); 3 - ( $21-30$ ); 4 - ( $31-40$ ); 5 - ( $41-50$ ); 6 - ( $51-60$ ); 7 - ( $61-119$ ); 8 - ( $120-180$ ); 9 - ( $> 180$ )

## DISCUSSION

This study was conducted to examine the aerobic and strength conditioning activities of West Coast SEALs and to evaluate the effectiveness of their self-selected training programs in maintaining physical readiness. A detailed questionnaire was administered to SEALs undergoing advanced training that provided information on the kinds and quantities of aerobic and strength conditioning activities in which they engaged. These data supplement information previously collected on the physical profiles of BUD/S trainees and platoon SEALs (Beckett et al., 1989).

Muza and colleagues (1987) have suggested that U.S. Army Special Forces personnel have the highest aerobic power ( $\dot{V}O_{2peak}$ ) within the U.S. military population. However, data previously collected on West Coast SEALs show they possess a higher  $\dot{V}O_{2peak}$  than the Army Special Forces (57.7 ml·kg<sup>-1</sup>·min<sup>-1</sup> for SEALs versus 54.4 ml·kg<sup>-1</sup>·min<sup>-1</sup> for Army Special Forces). Although the  $\dot{V}O_{2peak}$  of platoon SEALs is higher than that of other U.S. military members (Vogel, 1985), it is significantly lower than that of new BUD/S graduates (62.4 ml·kg<sup>-1</sup>·min<sup>-1</sup>) (Beckett et al., 1989). This decrement cannot be attributed solely to age differences (22.2 years for BUD/S and 25.9 years for SEALs); rather, it may reflect reduced training volume or relative ineffectiveness of the aerobic training methods SEALs employ after completion of BUD/S training.

The American College of Sports Medicine (ACSM) has published guidelines for the development and maintenance of cardiorespiratory (aerobic) and muscular fitness in healthy adults (American College of Sports Medicine, 1990). Most SEALs responding to the present questionnaire reported engaging in aerobic activities in frequencies (> 3 times/week), durations (> 30 minutes), and intensities (> 60%  $\dot{V}O_{2peak}$ ) necessary for the maintenance of aerobic fitness as established by the ACSM guidelines. All SEAL participants, except those in SDV Advanced Operator Training, performed running exercise exceeding the required volume. The high  $\dot{V}O_{2peak}$  reported for SEALs (Beckett et al., 1989) suggests that SEALs perform running at or above maintenance levels. However, from the previous profile data, platoon SEALs showed a diminished peak aerobic power after BUD/S training (Beckett et al., 1989). The literature suggests that reductions in peak aerobic power occurring with reduced training frequency may be counteracted by maintaining the training intensity in individuals of average peak aerobic power (Brynteson and Sinning, 1973; Hickson and Rosenkoetter, 1981; Hickson et al., 1982; Hickson et al., 1985; Neufer, 1989). The SEALs' average running pace reported in this study would elicit approximately 85% of SEALs' mean  $\dot{V}O_{2peak}$ , suggesting that the intensity is appropriate for maintaining the aerobic power in individuals of average aerobic fitness. However, there are few data on the characteristics of training required to maintain a high peak aerobic power.



Additionally, self-reports of the quantity of aerobic activity are often erroneous, especially in very active individuals (Klesges et al., 1990).

The previous profile data suggested that platoon SEALs have greater muscular strength than BUD/S trainees, which was attributed to a greater participation of SEALs in regular weight training (Beckett et al., 1989). In the previous study, only one BUD/S trainee participated in weight training more than three times per week, compared to 41% of platoon SEALs. In this study, 71% of SEALs reported regular participation in weightlifting exercise, with a mean frequency of 3.3 times/week. Frequency of participation is, however, only one component of strength development and maintenance.

The effectiveness of current SEAL strength conditioning programs may be evaluated by comparing SEAL strength levels with those of other athletes who must maintain high levels of both cardiorespiratory and strength fitness -- specifically, college football backs. Olson and Hunter (1985) surveyed the strength characteristics of Division I secondary defenders and offensive backs. Although these individuals are younger and somewhat larger than SEALs, they provide a reference group against which strength training outcomes may be evaluated. When normalized for body size (kg weight lifted per kg body weight), SEALs 1-RM for bench press (upper body) was comparable to, but slightly lower than, collegiate backs: 1.48 and 1.51 for SEALs and backs, respectively. Conversely, the normalized 1-RM squats were 1.73 and 2.02 for SEALs and backs, respectively. This relation is also seen when SEALs are compared to Division II college backs (Mayhew et al., 1987) and probably reflects the relative lack of SEALs' lower-body (compared to upper-body) strength training.

Limited data are available on the optimal quantities of conditioning activities required to maintain strength. The ACSM guidelines suggest at least two days per week of 8 to 12 repetitions per day to develop muscular strength. SEALs in this study performed, on average, according to these guidelines. However, many mission-essential tasks performed by SEALs require muscular power as well as strength and endurance. Neuffer and associates (1987) found that when swim training frequency was reduced from six times per week, muscular strength did not diminish over four weeks, even when training frequency was reduced to once per week. These competitive swimmers showed significant (13.6%) reductions in power, even when training frequency was dropped to three times per week. Thus, it is very important that the volume and intensity of strength training be maintained at a level sufficient to avoid a loss of muscular power.

These data provide a representative characterization of West Coast SEALs. Additional data were collected from East Coast SEALs and are currently being compared with the physical training habits and levels of aerobic and strength

fitness of West Coast SEALs. Although these data suggest that West Coast SEALs' volume of aerobic training (running, swimming, and cycling) meets ACSM guidelines for maintenance of aerobic conditioning, these levels appear somewhat modest compared to higher level recreational and club athletes. In contrast, exercises involving strength training (particularly upper-body training) received more attention and time than aerobic training. However, strength training produced outcomes only comparable to upper-body strength and somewhat poorer than lower-body strength of collegiate football backs.

Individuals in occupations requiring a high degree of aerobic fitness, muscular strength, endurance, and power must participate in conditioning activities with sufficient frequency and intensity to maintain high fitness levels. It appears that SEALs, on average, participate with sufficient frequency to maintain aerobic fitness, but the participation varies greatly among training activities. It also appears that platoon SEALs' peak aerobic power decreases significantly following BUD/S training. Overall, SEALs could attain higher levels of aerobic power and muscular strength through an increase in the volume of training, but these modifications must be individualized. Through education in basic principles of developing and maintaining aerobic power and strength, SEALs may implement better, and perhaps more uniform, training regimens, and effectively develop and maintain higher levels of aerobic and strength fitness than is demonstrated. The appropriate use of a combined aerobic and strength training program may prove to be a more effective method for SEALs to attain this goal. Additional research is needed to develop improved, efficient, and mission-specific physical training programs.

## REFERENCES

- American College of Sports Medicine. The recommended quantity and quality of exercise for developing and maintaining cardiorespiratory and muscular fitness in healthy adults. *Med. Sci. Sports Exerc.* 22(2):265-274; 1990.
- Barnes, L.; Strauss, R.H. The U.S. Navy SEAL team: Total commitment to total fitness. *Phys. Sportsmed.* 14:176-183; 1986.
- Beckett, M.B.; Goforth, H.W.; Hodgdon, J.A. Physical fitness of U.S. Navy special forces team members and trainees. 1989. Technical Report No. 89-29. Available from: Naval Health Research Center, San Diego, California.
- Brynteson, P.; Sinning, W.E. The effects of training frequencies on the retention of cardiovascular fitness. *Med. Sci. Sports* 5(1):29-33; 1973.
- Carter, J.E.L. The Heath-Carter Method. 1980. Available from: San Diego State University Syllabus Service, San Diego, California.
- Carter, J.E.L.; Rahe, R.H. Effects of stressful underwater demolition training on body structure. *Med. Sci. Sports* 7(4):304-308; 1973.
- Hickson, R.C.; Rosenkoetter, M.A. Reduced training frequencies and maintenance of increased aerobic power. *Med. Sci. Sports Exerc.* 13(1):13-16; 1981.
- Hickson, R.C.; Kanakis, C., Jr.; Davis, J.R.; Moore, A.M.; Rich, S. Reduced training duration effects on aerobic power, endurance, and cardiac growth. *J. Appl. Physiol.* 53(1):225-229; 1982.
- Hickson, R.C.; Foster, C.; Pollock, M.L.; Galassi, T.M.; Rich, S. Reduced training intensities and loss of aerobic power, endurance, and cardiac growth. *J. Appl. Physiol.* 58(2):492-499; 1985.
- Klesges, R.C.; Eck, L.H.; Mellon, M.W.; Fulliton, W.; Somes, G.W.; Hanson, C.L. The accuracy of self-reports of physical activity. *Med. Sci. Sports Exerc.* 22:690-697; 1990.
- Mayhew, J.L.; Levy, B.; McCormick, T.; Evans, G. Strength norms for NCAA Division II college football players. *NSCA J.* 9:67-69; 1987.
- Muza, S.R.; Sawka, M.N.; Young, A.J.; Dennis, R.C.; Gonzalez, R.R.; Martin, J.W.; Pandolf, K.B.; Valeri, C.R. Elite Special Forces: Physiological description and ergogenic influence of blood reinfusion. *Aviat. Space Environ. Med.* 58:1001-1004; 1987.
- Neufer, P.D.; Costill, D.L.; Fielding, R.A.; Flynn, M.G.; Kirwin, J.P. Effect of reduced training on muscular strength and endurance in competitive swimmers. *Med. Sci. Sports Exerc.* 19(5):486-490; 1987.
- Neufer, P.D. The effect of detraining and reduced training on the physiological adaptations to aerobic exercise training. *Sports Med.* 8(5):302-321; 1989.
- Olson, J.R.; Hunter, G.R. A comparison of 1974 and 1984 player sizes and maximal strength and speed efforts for Division I NCAA universities. *NSCA J.* 7:26-28; 1990.
- Vogel, J.A. A review of physical fitness as it pertains to the military services. 1985. Technical Report No. 14/85. Available from: U.S. Army Research Institute of Environmental Medicine, Natick, Massachusetts.

**ATTACHMENT 1**  
**PHYSICAL ACTIVITY QUESTIONNAIRE**

# PHYSICAL ACTIVITY QUESTIONNAIRE

Name \_\_\_\_\_ Date \_\_\_\_\_

Height \_\_\_\_\_ Weight \_\_\_\_\_ Age \_\_\_\_\_ Organization \_\_\_\_\_

Years of experience in a SEAL Team \_\_\_\_\_ Social Security Number \_\_\_\_\_

## CURRENT PHYSICAL ACTIVITY

The following questions are designed to provide information about exercise habits. Please read the instructions carefully and complete this questionnaire to the best of your ability.

Circle the number that most closely represents your present status:

- |                     |     |                           |     |
|---------------------|-----|---------------------------|-----|
| Combat Swimmer      | - 1 | Land Warfare              | - 2 |
| Maritime Operations | - 3 | Exercises                 | - 4 |
| Field Activities    | - 5 | Cold Weather Training     | - 6 |
| Classroom           | - 7 | Stand Down or Preparation | - 8 |
| Other               | - 9 |                           |     |

For SDV Team only:

- |               |      |     |      |
|---------------|------|-----|------|
| Core Training | - 10 | AOT | - 11 |
|---------------|------|-----|------|

### A. Frequency of Exercise (How many times per week or month do you exercise?)

Intensity - In the blank space next to selected frequency, place the number that best describes the intensity of each particular exercise.

1-very easy; 2-easy; 3-; 4-moderately difficult; 5-; 6-difficult; 7-; 8-intense; 9-; 10-very intense

	Never	1-4X Per Month	2X Per Week	3X Per Week	4X Per Week	5X Per Week	6X Per Week	7X Per Week or More
1. Running	0	1__	2__	3__	4__	5__	6__	7__
2. Scuba/snorkeling	0	1__	2__	3__	4__	5__	6__	7__
3. Swimming	0	1__	2__	3__	4__	5__	6__	7__
4. Bicycling	0	1__	2__	3__	4__	5__	6__	7__
5. Rowing	0	1__	2__	3__	4__	5__	6__	7__
6. Continuous walking	0	1__	2__	3__	4__	5__	6__	7__
7. Aerobic exercise class	0	1__	2__	3__	4__	5__	6__	7__
8. Weightlifting	0	1__	2__	3__	4__	5__	6__	7__
9. Calisthenics	0	1__	2__	3__	4__	5__	6__	7__
10. Racket sports/handball	0	1__	2__	3__	4__	5__	6__	7__
11. Basketball	0	1__	2__	3__	4__	5__	6__	7__
12. Baseball/softball	0	1__	2__	3__	4__	5__	6__	7__
13. Football	0	1__	2__	3__	4__	5__	6__	7__
14. Volleyball	0	1__	2__	3__	4__	5__	6__	7__
15. Boxing/wrestling	0	1__	2__	3__	4__	5__	6__	7__
16. Martial arts	0	1__	2__	3__	4__	5__	6__	7__
17. Obstacle course	0	1__	2__	3__	4__	5__	6__	7__
18. Other (specify: _____)	0	1__	2__	3__	4__	5__	6__	7__

**B. Duration of Workouts** (What is the average time per session you spend exercising?)

	Not Appli- cable	Less Than 11 Minutes	11-20 Minutes	21-30 Minutes	31-40 Minutes	41-50 Minutes	51-60 Minutes	61-119 Minutes	2-3 Hours	More Than 3 Hours
1. Running	0	1	2	3	4	5	6	7	8	9
2. Scuba/snorkeling	0	1	2	3	4	5	6	7	8	9
3. Swimming	0	1	2	3	4	5	6	7	8	9
4. Bicycling	0	1	2	3	4	5	6	7	8	9
5. Rowing	0	1	2	3	4	5	6	7	8	9
6. Continuous walking	0	1	2	3	4	5	6	7	8	9
7. Aerobic exercise class	0	1	2	3	4	5	6	7	8	9
8. Weightlifting	0	1	2	3	4	5	6	7	8	9
9. Calisthenics	0	1	2	3	4	5	6	7	8	9
10. Racket sports/handball	0	1	2	3	4	5	6	7	8	9
11. Basketball	0	1	2	3	4	5	6	7	8	9
12. Baseball/softball	0	1	2	3	4	5	6	7	8	9
13. Football	0	1	2	3	4	5	6	7	8	9
14. Volleyball	0	1	2	3	4	5	6	7	8	9
15. Boxing/wrestling	0	1	2	3	4	5	6	7	8	9
16. Martial arts	0	1	2	3	4	5	6	7	8	9
17. Other (specify: _____)	0	1	2	3	4	5	6	7	8	9

**C. Exercise History** (How long have you been on this or a similar schedule?)

	Not Appli- cable	Less Than 1 Month	1-3 Months	4-11 Months	1-2 Years	3-4 Years	5 Years or More
1. Running	0	1	2	3	4	5	6
2. Scuba/snorkeling	0	1	2	3	4	5	6
3. Swimming	0	1	2	3	4	5	6
4. Bicycling	0	1	2	3	4	5	6
5. Rowing	0	1	2	3	4	5	6
6. Continuous walking	0	1	2	3	4	5	6
7. Aerobic exercise class	0	1	2	3	4	5	6
8. Weightlifting	0	1	2	3	4	5	6
9. Calisthenics	0	1	2	3	4	5	6
10. Racket sports/handball	0	1	2	3	4	5	6
11. Basketball	0	1	2	3	4	5	6
12. Baseball/softball	0	1	2	3	4	5	6
13. Football	0	1	2	3	4	5	6
14. Volleyball	0	1	2	3	4	5	6
15. Boxing/wrestling	0	1	2	3	4	5	6
16. Martial arts	0	1	2	3	4	5	6
17. Other (specify: _____)	0	1	2	3	4	5	6

D. Exercise Surfaces/Equipment (How often do you exercise on these surfaces/use this equipment?)

	Not Appli- cable	1-4X Per Month	2X Per Week	3X Per Week	4X Per Week	5X Per Week	6X Per Week	7X Per Week or More
1. Run on soft sand	0	1	2	3	4	5	6	7
2. Run on hard sand or packed dirt	0	1	2	3	4	5	6	7
3. Run on grass	0	1	2	3	4	5	6	7
4. Run on asphalt	0	1	2	3	4	5	6	7
5. Run on concrete	0	1	2	3	4	5	6	7
6. Run on artificial track surface	0	1	2	3	4	5	6	7
7. Scuba/snorkel in pool	0	1	2	3	4	5	6	7
8. Scuba/snorkel in ocean	0	1	2	3	4	5	6	7
9. Scuba/snorkel with fins	0	1	2	3	4	5	6	7
10. Scuba/snorkel without fins	0	1	2	3	4	5	6	7
11. Swim in pool	0	1	2	3	4	5	6	7
12. Swim in ocean	0	1	2	3	4	5	6	7
13. Swim with fins	0	1	2	3	4	5	6	7
14. Swim without fins	0	1	2	3	4	5	6	7
15. Bicycle on the road	0	1	2	3	4	5	6	7
16. Bicycle on a stationary cycle	0	1	2	3	4	5	6	7
17. Row a boat or shell	0	1	2	3	4	5	6	7
18. Row on a machine	0	1	2	3	4	5	6	7
19. Play racket sports/handball on wood	0	1	2	3	4	5	6	7
20. Play racket sports/handball on asphalt	0	1	2	3	4	5	6	7
21. Play racket sports/handball on concrete	0	1	2	3	4	5	6	7
22. Play basketball on wood	0	1	2	3	4	5	6	7
23. Play basketball on asphalt	0	1	2	3	4	5	6	7
24. Play basketball on concrete	0	1	2	3	4	5	6	7
25. Play volleyball on sand	0	1	2	3	4	5	6	7
26. Play volleyball on grass	0	1	2	3	4	5	6	7
27. Play volleyball on wood	0	1	2	3	4	5	6	7
28. Play volleyball on asphalt	0	1	2	3	4	5	6	7
29. Play volleyball on concrete	0	1	2	3	4	5	6	7

H. Weightlifting (If you do not lift weights, skip this section)

Repetition = one complete exercise movement

Set = a number of continuous repetitions

1-repetition maximum = the greatest weight that can be lifted in one repetition

Intensity (In this column, place the number that best describes the intensity of each particular exercise):

1-very easy; 2-easy; 3-; 4-moderately difficult; 5-; 6-difficult; 7-; 8-intense; 9-; 10-very intense

Modality (In this column, place the number that best describes the modality of each particular exercise):

1-free weights; 2-universal; 3-nautilus; 4-friction or hydraulic resistance; 5-other

IF YOUR SETS, REPETITIONS, OR LOADS VARY, USE THE AVERAGE FOR YOUR RESPONSE TO THESE QUESTIONS

Body Weight: \_\_\_\_\_ pounds

Exercise	1 Repetition Maximum	Sets	Repetitions	Intensity	Average Weight	Duration*	Modality
Neck	_____	_____	_____	_____	_____	_____	_____
Upright Rowing	_____	_____	_____	_____	_____	_____	_____
Bent Rowing	_____	_____	_____	_____	_____	_____	_____
Bench Press	_____	_____	_____	_____	_____	_____	_____
Military Press	_____	_____	_____	_____	_____	_____	_____
Incline Press	_____	_____	_____	_____	_____	_____	_____
Biceps Curl	_____	_____	_____	_____	_____	_____	_____
Triceps Curl	_____	_____	_____	_____	_____	_____	_____
Wrist Curl	_____	_____	_____	_____	_____	_____	_____
Sit-up with weights	_____	_____	_____	_____	_____	_____	_____
Leg Press	_____	_____	_____	_____	_____	_____	_____
Squat	_____	_____	_____	_____	_____	_____	_____
Leg Curl	_____	_____	_____	_____	_____	_____	_____
Toe Raises	_____	_____	_____	_____	_____	_____	_____
Latissimus Pull	_____	_____	_____	_____	_____	_____	_____
Leg Extension	_____	_____	_____	_____	_____	_____	_____
Stair Climb	_____	_____	_____	_____	_____	_____	_____
Others (specify)	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____

\*Entire time spent performing this exercise, including rest between sets.



REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE November 1991		3. REPORT TYPE AND DATE COVERED Final 12/90-11/91
4. TITLE AND SUBTITLE Characteristics of Physical Training Activities of West Coast U.S. Navy Special Forces Team Members			5. FUNDING NUMBERS Program Element: 62233N Work Unit Number: MM33P30.002-6005	
6. AUTHOR(S) W.K. Prusaczyk; H.W. Goforth, Jr.; M.L. Nelson				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Health Research Center P. O. Box 85122 San Diego, CA 92186-5122			8. PERFORMING ORGANIZATION Report No. 90-35	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) Naval Medical Research & Development Command 8902 Wisconsin Ave Bethesda, MD 20889-5606			10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION/AVAILABILITY STATEMENT  Approved for public release; distribution is unlimited.			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) A physical training activity questionnaire was administered to 102 West Coast Naval Special Warfare personnel (SEALs). Responses provided information on the types, frequencies, and intensities of aerobic and strength training activities and locations. The responses were used to characterize training according to the American College of Sports Medicine (ACSM) guidelines for development and maintenance of aerobic and strength fitness. Overall, SEALs reported engaging in aerobic activities in frequencies, intensities, and durations sufficient to maintain aerobic fitness. Strength conditioning, which tended to concentrate on the upper body, also occurred in sufficient frequency and quantity for maintenance of current fitness levels. However, the overall volume of training was somewhat less than for most elite or competitive athletes. The quality of physical training programs varied widely among the advanced SEAL training courses.  Through education in the basic principles of athletic training, SEALs could implement more effective training regimens to develop and maintain aerobic and strength fitness. Ultimately, SEALs could achieve higher levels of readiness for demanding missions.				
14. SUBJECT TERMS			15. NUMBER OF PAGES 24	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT Unlimited	